REMARKS

The amendment to the specification is to correct an inadvertent typographical error. Basis for the amendments to the claims is found at page 7, line 6 and original claim 2. The non-elected claims 13-25 have been canceled.

Applicants' invention is directed to methods for forming a dielectric layer on semiconductor devices that utilize a silicon-containing material for the dielectric layer. In one embodiment, a silicon-containing material is deposited on a substrate. The deposited material is heated with a reactive agent to react with silicon atoms of the deposited material to form the dielectric layer. The silicon-containing dielectric layer provides improved or smaller semiconductor devices by reducing leakage and increasing the dielectric constant.

In the Office Action, the Examiner rejected claims 1, 2, 5, 6, 8, 12, and 26-29 under 35 USC §102(e) as anticipated by Huang et al. Huang et al. discloses a conventional semiconductor fabrication method to form a dielectric structure. Depositing a dielectric layer 120 over an electrode 100 forms the dielectric structure. Then a layer of silicon nitride 130 is formed over the dielectric layer 120. A layer of silicon nitride endures a second nitridation process to remove any punctures 132 in the silicon nitride layer 130, thereby producing a smooth silicon nitride layer 130a. The layer of silicon nitride 130a and dielectric layer 120 form a dielectric structure over the electrode 100.

It is apparent from the rejection that the Examiner alleges that the primitive oxide layer 110 that forms on polysilicon conductive layer 100 meets the claim language "depositing a silicon-containing material" and "forming the dielectric layer" with a reactive agent. However, claims 1 and 26 have now been amended to recite that the silicon source comprises a silazane. Huang et al do not teach or suggest a process using a silazane material. Rather, Huang et al simply deposit polysilicon, and the surface of the deposited polysilicon becomes oxidized by exposure to air. Subsequent nitridation steps also do not teach or suggest the use of a silazane. Claims 5, 6, and 8, which depend form claim 1, and claims 27-29, which depend from claim 26, are also patentable over Huang et al for the same reasons.

With respect to claim 12, the Examiner has asserted that Huang et al teach "vapor depositing a silicon-containing material (col. 4, line 4-10) from a self limiting silicon source (polysilicon), see column 3, lines 30-33." However, it appears that the Examiner has taken disclosures from different portions of Huang et al's process and attempted to combine those disclosures in a manner that is not supported by the reference. The column 4 teaching regarding vapor deposition refers to a later nitridation process. That passage teaches the deposition of silicon nitride "over the dielectric layer 120." Thus, Huang et al do not teach or suggest "vapor depositing a silicon-containing material from a self limiting silicon source on at least a portion of the substrate, wherein said portion of said substrate is conductive" as recited in claim 12.

Further, nowhere in Huang is it taught that the polysilicon layer 100 comprises a "self limiting silicon source." In fact it is not, as the primitive oxide 110 may form on the polysilicon layer 100 to a number of different depths depending on conditions. The oxidation reaction is not self-limiting as the entire substrate comprises silicon. Applicants, however, deposit a desired amount of silicon-containing material on the substrate that limits the reaction during processing with a reactive ambient. That is, once the deposited material has reacted, the reaction is complete. For all of these reasons, Huang et al do not teach or suggest the subject matter of claim 12.

Also in the Office Action, the Examiner rejected claims 3, 4, and 7 under 35 USC §103 as unpatentable over Huang et al. The Examiner concluded that it would have been obvious to use the silicon sources recited in the claims in the process of Huang et al "because it is commonly used to form [a] dielectric layer." The Examiner cited to *In re Leshin*, 125 USPQ 416, for the proposition that it is within the general skill in the art to select a known material for use in its intended manner.

However, claims 3, 4, and 7 depend from amended claim 1 and are believed to be patentable for the reasons that claim 1 is patentable. Further, the silicon source SiH_4 mentioned at column 4 of Huang et al is with reference to a later nitridation procedure, not to the formation of dielectric layer 120. Layer 120 of Huang et al is formed from an existing primitive oxide, not from a separately deposited silicon-containing material. Thus, even if Huang et al were modified as proposed by the

Examiner, it would still not result in the claimed process. For all of these reasons, applicants submit that claims 3, 4, and 7 are patentable over Huang et al.

Also in the Office Action, the Examiner rejected claims 9-11 under 35 USC §103 as unpatentable over Huang et al in view of Nishio et al. Nishio et al is cited by the Examiner as disclosing the deposition of a silazane material on a semiconductor substrate.

However, the rejection ignores the fact that the Examiner has asserted that it is the deposition of polysilicon layer 100 in Huang et al's process that is supposed to meet the claim language of "vapor depositing a silicon-containing material." Nothing in Huang et al teaches or suggests that the polysilicon layer 100 is to be vapor deposited. And, one skilled in the art would not attempt to form a **conductive layer** 100 using a silazane. The rejection falls apart because Huang et al do not teach or suggest a separate vapor deposition of silicon-containing material to form a dielectric layer. Rather, Huang et al form a dielectric layer from the primitive oxide that forms on the already deposited polysilicon. For all of these reasons, applicants submit that claims 9-11 are patentable over the art.

Finally in the Office Action, claims 31 and 32 were rejected under 35 USC §103 as unpatentable over Chew et al in view Nishio et al. The Examiner asserted that Chew et al teach a process in which a silicon-containing material is vapor deposited over a substrate. The Examiner conceded that Chew et al did not teach or suggest the use of a silazane, but asserted that Nishio et al did and that it would have been obvious to use a silazane in the process of Chew et al.

However, the vapor deposition passage in Chew et al referenced by the Examiner (col. 3, lines 55-63) is directed to an alternative embodiment where the substrate material is not polysilicon. In this alternative embodiment, Chew et al combine a silicon-containing gas with nitrogen plasma to form silicon nitride in a single step and at relatively low temperatures (i.e., 300 to 500°C). Thus, Chew et al do not teach or suggest a process that includes vapor deposition of a silicon-containing material comprising a silazane followed by rapid thermal nitridization (RTN). Even if it would have been obvious to use a silazane in the Chew et al process, the claimed process would not result

because Chew et al teach a single step process using high density plasma (HDP) to form silicon nitride. For all of these reasons, the rejection of claims 31-32 is not well taken and should be withdrawn.

For all of the above reasons, applicants submit that claims 1, 3-12 and 26-32, as amended, are patentable over the cited and applied art of record. Early notification of allowable subject matter is respectfully solicited.

Respectfully submitted,

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